2015

Maximizing Functional Outcomes in a Patient with a Complete Cervical Spinal Cord Injury

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MAXIMIZING FUNCTIONAL OUTCOMES IN A PATIENT WITH A COMPLETE CERVICAL SPINAL CORD INJURY

by

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A Scholarly Project Submitted to the Graduate Faculty of the

Department of Physical Therapy
School of Medicine and Health Sciences

University of North Dakota

in partial fulfillment of the requirements for the degree of

Doctor of Physical Therapy

Grand Forks, North Dakota
May, 2015

This Scholarly Project, submitted by Samantha Braegelmann in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

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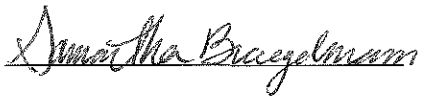
Signature 

Date 10/2/14

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ACKNOWLEDGEMENTS

I would like to thank St. Charles Hospital and my clinical instructor, Megan Gleason for the opportunity to work with this patient. I gained valuable experience and information, and grew as a clinician through this clinical experience. I would also like to thank my professors at the University of North Dakota for providing me with a well-rounded education and guiding me through this program. I would also like to thank my parents Gerald and Lisa Braegelmann, my brother Jake Braegelmann, and significant other Taylor Erickson for all your support and love they have provided me over the years.

ABSTRACT

Background and Purpose: Spinal cord injury is damage sustained to any nervous tissue in the spinal cord that results in loss or decreased motor function or sensation. Every year in the United States there is about 12,000 new cases of spinal cord injuries with young Caucasian males' most prevalent[1]. The purpose of this scholarly article is to analyze various factors to maximize functional outcomes and determine the proper course of treatment following a spinal cord injury. **Case Description:** Patient was a right handed Caucasian female who was involved in a minor motor vehicle accident and sustained a C7-T1 fracture. Surgical intervention was done with a fusion of C6-T1. **Intervention:** The patient was seen six days/week for five weeks for one hour therapy sessions. Interventions implemented were all functionally based with the main focus of physical therapy being bed mobility, sitting balance, transfers, and self-directing care. **Outcomes:** Outcome measurements were taken at every treatment session. This included determining the amount of assistance the patient required when performing functional activities. **Results:** Patient was able to make significant gains in achieving more independence with functional activities. Without the limitations of the neck brace the patient would have been able to gain more functional independence during this episode of care. Patient was able to be discharged to her home after family members made the necessary changes to make the home wheelchair accessible and obtain 24 hr. care services. **Discussion:** Interventions chosen along with patient's motivation level and participation in all therapy sessions maximized outcomes. Thus, a holistic approach and ongoing analysis/research is required to determine the best approach to maximize functional outcomes in patients with a complete cervical spinal cord injury.

CHAPTER I

BACKGROUND AND PURPOSE

Spinal cord injury (SCI) is damage sustained to any nervous tissue in the spinal cord that results in loss or decreased motor function or sensation. There are about 236,000 to 327,000 individuals in the United States currently with some form of SCI and about 12,000 new cases per year. Of those 12,000 new cases, the primary causes were motor vehicle accidents (39.2%), followed by falls (28.3%) and violence (14.6%). The common demographics at the time of sustaining a spinal cord injury are an average age being 28.7 years and most likely a Caucasian male.[2] The American Spinal Injury Association (ASIA) developed an ASIA Classification Scale that determines the level of injury, the severity of the injury, and classification of injury[3] (see Table 1).

Table 1. ASIA Classification Scale as defined by the American Spinal Injury Association

Classification	Description
A	Complete; no sacral motor or sensory sensation in segments S4-5
B	Sensory incomplete; preservation of sensation below the level of the injury
C	Motor incomplete; voluntary anal sphincter contraction or sensory sacral sparing, with sparing of motor functional distal to 3 levels below the motor level of injury, and with the majority of key muscles having a strength grade of less than 3/5.
D	Motor incomplete; voluntary anal sphincter contraction or sensory sacral sparing, with sparing of motor functional distal to 3 levels below the motor level of injury, and with the majority of key muscles having a strength grade of 3/5 or greater.
E	Normal; normal motor and sensory recovery, and hyperreflexia may be present

Spinal cord injuries fall into the following categories: incomplete tetraplegia (paralysis of all four limbs at 30.1%), complete paraplegia (paralysis of the legs and lower body at 25.6%), complete tetraplegia (20.4%), and incomplete paraplegia (18.5%).[1] Patients who sustain a cervical spinal cord injury account for about 55% of the total SCI population and are often either young males or elderly females, with the leading cause being falls or motor vehicle accidents.[2]

A higher spinal cord level and a more severe injury to the nervous tissue in the spinal columns will greatly affect the amount of functional gains a patient will sustain during the recovery process. A person who sustains a C1-C4 Grade A SCI will have little to no movement of the upper extremities and no lower extremity muscle usage. Unfortunately, ASIA-A classified populations have a 0% chance of ambulating one year post SCI if they remain at ASIA-A. Although 10% of patients are able to move out of ASIA-A, 2.8% of those move to an ASIA-D or E classification. If a patient is able to move out of ASIA-A, the patient has a greater than 20% chance of ambulating one year post SCI, depending on their new ASIA classification.[4] The main movements a C1-C4 tetraplegic patient would have are head and neck control and shoulder shrug. With an injury above C4, an individual will have little to no innervation of the diaphragm (C3, 4, 5) and will require some sort of long-term ventilator and feeding assistance. A person with C5 tetraplegia will maintain elbow flexion plus retain head and neck control and be able to perform a shoulder shrug. With assistive devices, patients with this level of SCI may achieve independence with grooming and feeding and have the ability to assist a care giver with bed mobility and upper body dressing. An injury sustained at C6 is the highest level to which a person is able to perform functional activities such as eating, grooming, bathing, bowel and bladder care, and transfers with the use of assistive devices. However at this level, patients will be able to perform bed mobility independently. An injury at C7 is the highest level at which a

person can live independently and without adaptive equipment because they have the ability to extend their elbow which greatly enhances their mobility and self-care. An individual with C7 tetraplegia may be able to drive an adaptive van or car that is controlled by hand controls and, with or without an assistive device, be able to write, type, answer the phone, use a computer and turn the page of a book or magazine.[5,6,7] Often with a spinal cord injury, a patient will have an increased risk for autonomic dysreflexia, urinary tract infection (UTI), pneumonia, contractures, decreased blood circulation/coronary artery disease, decreased bowel/bladder management, and osteoporosis.[8,9]

There are multiple factors which play a significant role in a patient's recovery process following a spinal cord injury. The first main factor is timing of surgical intervention. Early surgical intervention is associated with earlier transition from acute to inpatient rehabilitation and decreased length of stay by an average of 7.5 days (ANOVA $F=3.80$, $P= .023$).[11] Delaying surgical intervention causes an increased financial cost and pulmonary complications such as atelectasis, a complete or partial collapse of a lung or lobe of a lung, and pneumonia.[10, 11] Another factor is a person's age. The older a person was when sustaining a SCI, especially when >50 years old, the higher the level of the injury. A third factor affecting recovery is the completeness of the SCI which will cause a patient to have significantly lower manual muscle testing (MMT) scores and altered respiration function at initial admission.

Ultimately, with a sudden decrease in activity level post injury, a significant decrease in physical capacity occurs including decreased quality of life and loss of independent function.[7] Early rehabilitation is one of the most significant factors for substantial gains no matter the age, level of injury, or completeness of spinal cord injury. Early rehabilitation is associated with a decreased length of stay, increased manual muscle test (MMT) results, improved respiration and

physical capacity, quality of life, and a quicker increase in Functional Independence Measure (FIM) scores. The most substantial and significant gains in these categories are often made during the first six months after spinal cord injury.[6,12]

Functional mobility is inversely related to the level of the spinal cord injury. A higher level of injury causes a lower score on the FIM.[13] The FIM contains 18 items (13 motor, 5 cognitive items) which are ranked on a 0-7 scale (0=activity does not occur and 7= complete independence). A low score indicates an individual requires total assistance, and a high score indicates a higher level of independence with functional tasks. Functional mobility will most significantly affect a FIM score when a SCI occurs at C6 versus C7. Having the ability to retain functional triceps will dictate the level of independence and minutes of assistance per day.[13] According to research, the ability to achieve a 20 point gain on the FIM negatively correlates to needing assistance, approximately 120 minutes less per day.[14]

According to research, performing the Spinal Cord Independence Measure (SCIM) is a better functional assessment tool than the Functional Independence Measure with greater sensitivity to change, and is not culturally biased (sensitivity = Pearson Correlation = .79; $p<.001$, cultural unbiased = Kappa Value=.631-.823; $p<.001$).[15] Thus the SCIM is a great way to objectively measure the patient's functional independence versus a clinician's subjective interpretation of a patient's functional mobility. It will also show the patient's progression throughout the episode of care and more accurately determine the amount of assistance required per day.

No matter what the initial admission FIM or SCIM scores are, everyone with the same diagnosis/level of injury will end up with a very similar functional status.[16] The path to which a SCI patient obtains their optimal functional status is dependent upon the interaction and timing

of all the factors mentioned previously. All of these factors and research statistics are important to know when talking with patients and answering the tough questions they ask, as well as when establishing realistic goals and developing the physical therapy plan of care.

Early inpatient rehabilitation is a prerequisite to ensure best possible outcomes including a decrease in length of stay, mortality, and complications.[8,9,17] According to research, patients with tetraplegia or paraplegia who had greater than or equal to a grade of 1/5 muscle strength in key muscles one month post SCI had an 86% chance of regaining strength greater than or equal to 3/5 in the same muscle group.[18] Those patient with spared pin prick sensation had an 85% chance of regaining muscle strength of greater than or equal to 3/5. Without spared pin prick sensation, patients had a 1.3% chance of regaining strength greater than or equal to 3/5.[19] Manual muscle testing results are based on a 1-5 scale, with 1 = trace, 2 = poor, 3 = fair, 4 = good, 5 = normal. Achieving a score of 3/5 on the manual muscle testing means the muscle was able to perform its function/action against gravity, and a 4-5/5 means the muscle was able to move against gravity plus extra resistance. Functionally this means a patient can move their upper extremity to perform functional tasks (such as grooming, putting dishes away etc.) more independently.

According to research, exercise training causes an increase in arm ergometry by 81%, decreases heart rate with increased intensity, increases upper extremity strength by 19-34%, decreases stress, along with decreased depression and pain, and increases satisfaction in physical performance and health in patients with SCI.[20]

Using game-based exercises post SCI will increase dynamic short sitting by causing the patient to perform interactive movements that vary direction, amplitude, and precision. This game-based exercise program was shown to increase dynamic balance and decrease the number

of falls during functional activities.[21] Patients with SCI who are part of an exercise training program are able to maintain gains made in physical capacity and health benefits one year post discharge.[7]

For patients with SCI who wish to continue working, only about 28% will be able to find jobs and it may take up to two years to find one. Of those patients who found a job, the majority were white males who had an educational background and were interested in working post injury.[8] This is important for physical therapists to consider because having a job is a significant part of a person's quality of life and feeling of self-worth. Being able to provide the right resources (ex. vocational rehab) to patients will provide an individual a better opportunity to have a source of income, increased self-worth, have a higher quality of life, and decreased depression.[22, 23]

The goal of a physical therapist is to assist individuals to maximize their functional outcomes in an effective and efficient manner. With such a large population of patients with SCI, there is currently minimal literature that looks at multiple factors that influence a patient's functional outcome in the same study. A patient cannot be treated as a single factor; each individual is multi-faceted. Thus, a holistic approach and ongoing analysis is required to determine the best approach to maximize functional outcomes in patients with SCI.

The purpose of this scholarly project is to analyze various factors to maximize functional outcomes in a patient with a cervical SCI. This case study will also determine if the proper course of physical therapy treatment to maximize function was used based on the factors the patient presented with and her outcomes following physical therapy.

CHAPTER II

CASE DESCRIPTION

The patient was a right-handed 70 year-old Caucasian female who sustained a C7-T1 fracture, fractured sternum, and multiple right side rib fractures during a minor motor vehicle accident. Patient went into surgery immediately upon arrival to the hospital and the surgeon performed a C6-T1 fusion. The surgeon's notes indicated no complications during surgery but required patient to be in a Minerva Brace during the day and a Miami J Brace when sleeping (see Figures 1 and 2) until surgeon stated otherwise.

Figure 1: Minerva Brace

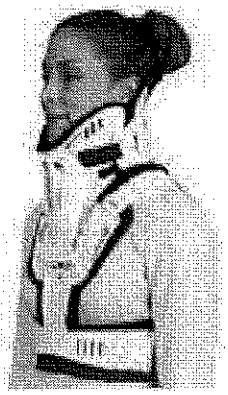

Figure 2: Miami J Brace

Upon her chart review, the patient was noted to be cognitively alert and orientated times three. She lived with her husband in a single story house in a nearby town and had three adult step children. She was allergic to penicillin and sulfa, had a neurogenic bowel, and was on a

dysphagia one diet (food needed to be pureed due to swallowing difficulties) with honey thick liquids. Patient sustained a pneumothorax during the car accident, was on 2L of O_2 24/7, and had a urinary tract infection. Her past medical history included depression, osteoporosis, and hyperlipidemia but there was no other significant medical history. Nursing reported patient was dependent with functional mobility with a max assist of two to complete all ADL's and required a Hoyer Lift for transfers (hospital bed to commode or powered wheelchair).

EXAMINATION/EVALUATION

Prior to injury, patient was completely independent in all activities, lived an active lifestyle (golf and yoga), and spent her winters in AZ. During the initial physical therapy evaluation in acute care, a systems review was performed (heart rate, blood pressure, and respiratory rate) which were all within normal limits (WNL). Physical therapy performed an ASIA Exam (neurological and motor examination of upper and lower extremity, including ROM).

The ASIA results were ASIA-A classification with a single neurological level of C5 and zone of partial preservation (ZPP) of sensory on the right C7 and left T1 and motor on the right T1 and left T1. Patient was unable to perform AROM with her lower extremities, but PROM was WNL bilaterally. Upper extremity AROM was WNL bilaterally for shoulder, elbow and wrist, and PROM for hands was WNL bilaterally.

Interpretation of ASIA results indicated the patient sustained a complete SCI at C7 which resulted in weak hand grip strength, spared triceps, and had a significant deficit in sensation through most of the upper and lower extremities. The functional mobility analysis indicated

patient required significant assistance in ADL's, was a safety risk for falls, and at an increased risk for pressure ulcers.

The results from the ASIA classification system are considered very reliable as research has shown there is a high inter-rater reliability on having two clinicians obtaining the same results, with a .68-.78 Kappa Coefficient.[24] This means that every clinician who reads the results from an ASIA test can be sure that the results are accurate, and they are able to interpret and determine an accurate prognosis and plan of care.

Once the patient was more stable and able to tolerate three hours of therapy a day, she was transferred to the inpatient rehabilitation portion of the hospital, which was nine days after her spinal cord injury and fusion surgery. A functional mobility assessment determined the patient was dependent in bed mobility, rolling, and sliding board transfers from wheelchair to mat table. Patient required max assistance with sitting balance at the edge of the mat table and wheelchair management (locking breaks, wheelchair propulsion, maneuvering around obstacles, and wheelchair placement for transfers, etc.). During the rolling activities, patient complained of dizziness. Upon further assessment, an upbeat eye movement was visually present, indicative of Benign Paroxysmal Positional Vertigo (BPPV).[25] A skin assessment was also completed and revealed the patient had significant reddening over the sacrum indicative of a grade one pressure ulcer.

DIAGNOSIS

The practice pattern for this patient was Impaired Motor Function and Sensory Integrity Associated with Progressive Disorders of the Central Nervous System, 5E and the ICD code was 344.03 (Quadriplegia, C5-C7, complete).

PROGNOSIS

Based on the patient's ASIA classification, functional status, age, and co-morbidities, her prognosis was determined to be good. With the patient's past medical history of depression and evidence showing 20-45% of SCI patients have depression[26], the patient was continually monitored to ensure her depression was managed. Depression can cause decreased motivation, decreased participation in functional activities and therapy sessions, increased time spent in bed, increased medical assistance and nursing care, and decreased feelings of self-worth and autonomy. This decreased self-worth and autonomy has been shown to increase depression and thus would cause the vicious cycle of decreased physical activity, increased dependence, and decreased feeling of self-worth and autonomy to occur.[26,27] The patient's strong family support was another factor that determined a good prognosis. According to research, structural or functional social support correlated with patient adherence to medical regimens to be 1.74 times higher in patients from cohesive families versus families in conflict.[28] There were no other outlying factors that impacted the development of the plan of care. The patient's ability to achieve the anticipated goals and expected outcomes of the interventions during her episode of care in the inpatient rehabilitation unit was high.

PLAN OF CARE

The anticipated length of stay was five weeks. Physical therapy was scheduled for one hour sessions with six days per week for a total of 30 treatment sessions during this episode of care. To assist the family in understanding the patient's diagnosis, educational material was given. The educational material included the book "Yes, You Can!: Guide to Self-Care for Persons with Spinal Cord Injury", 4th ed. and Craig Hospital SCI videos. These educational materials covered topics such as bowel/bladder management, autonomic dysreflexia, sexual health/reproduction, posture/limb preservation, potential home modifications, skin care, and nutrition/weight management. Patient and family members were always encouraged to ask questions on any educational material. If the questions were outside of the physical therapy scope of practice, the therapist would notify the proper healthcare team member who would be appropriate to answer those questions.

Based on the examination and evaluation, the therapist developed goals for discharge which included requiring only supervision with bed mobility in a hospital bed, supervision with sliding board transfers, supervision in sitting balance for one min without upper extremity support, supervision with wheelchair management for set up of transfers, modified independence with pressure relief in wheelchair, and modified independence with wheelchair mobility up to 50 meters. Patient's goal was to return home with her husband.

Every week there were two meetings with the medical doctor, nursing staff, social worker, occupational therapy, physical therapy, speech therapy, and psychology to discuss patient's progress in goals, address issues that may hinder progression, and to make sure all team members were on the same page. This included scheduling patient's therapy sessions around a bowel/bladder management program, other healthcare team member appointment sessions, and

caregiver training sessions.

Every week, functional activities were assessed because they were the primary focus of physical therapy treatment sessions. This was done to ensure the patient would be able to perform the necessary activities essential to make the transition home more successful. Each week the number of repetitions and/or the amount of assistance was altered while being mindful not to overwork/injure the patient's shoulders and to maintain patient's safety during transfers and mobility activities. The plan was to discharge her home to a neighboring town, so that 24 hr. care would be given by four rotating caregivers (twin sister, step daughter who was a CNA, cousin, and hired help).

CHAPTER III

INTERVENTION

Physical therapy was scheduled for one hour sessions, six days per week, for a total of 30 treatment sessions during her five weeks of inpatient rehabilitation stay. Following a well prescribed inpatient rehabilitation plan of care, 94.1% of individuals are able to return home following a SCI.[23] If the length of stay is too short, there will be an increased risk of re-hospitalization, needed discharge to a skilled nursing facility (SNF) or other more restrictive environment, and decreased community involvement.[22] The following is a week by week break down of the events associated with the patient's physical therapy plan of care to address functional limitations and assist with the patient's personal goal of returning home. Patient wore her Minerva Brace at all physical therapy sessions which limited her ability to perform functional activities.

Week 1: The therapy session focus for week one consisted of modified Dix-Hallpike which is a series of maneuvers in a trendelenburg position on her hospital bed to allow the crystal to move into the proper ear canal[25], sliding board transfers from hospital bed < >wheelchair< >mat table, sitting balance in A-frame (sitting at edge of mat table with hands gripping the edge of the mat table) and tripod (sitting at edge of mat table with hands placed posteriorly on the mat table), bed mobility, breathing exercises, and punching exercises to gain momentum for mobility. During the first week of therapy sessions the patient required maximum assistance, frequent verbal cueing, demonstration, and verbal encouragement to perform all functional activities. A Q/A

session was scheduled for the patient to be able to visit with someone else who had sustained a SCI, and discuss how the recovery process went for them, and what to expect during her recovery.

Due to a stage one pressure sore on her sacrum, a protocol of every two hour rotation in her hospital bed was initiated to prevent the pressure ulcer from progressing. Nursing was notified and shown how to properly position patient in side-lying to ensure patient was adequately rotated every two hours. Patient was also given a timer as a reminder to reposition herself when in her wheelchair.

Week 2: Physical therapy sessions consisted of 1/2 and 3/4 rolling in bed and mat table, transitional movements between A-frame and tripod sitting, transitioning from forearm support in side-lying to upright sitting position, scooting, balance sustainment and recovery in sitting, head/hip relationship during transfers, bed mobility, and sliding board transfers. Patient required moderate assistance when on the mat table and the hospital bed with these functional activities, along with frequent verbal cueing, demonstration, and verbal confirmation of her gains.

Patient education was focused on skin care and autonomic dysreflexia. An appointment was scheduled during this week with PacMed to fit the patient with a personalized motorized wheelchair. Another appointment was made with the therapy aide to obtain measurements necessary to make leg loops to assist patient with lower extremity management during independent transfers.

Week 3: Physical therapy focus for week three consisted of independent sliding board management during transfers, touching floor and returning to an upright sitting position, importance of scapular power for scooting forward/backward and medial/lateral, lower extremity management during transfers, standing frame machine (blood pressure regulation), and bed

mobility. Patient required moderate assistance with functional activities for the first attempt. After verbal discussion and cueing, patient was able to perform activities with minimal assistance and with moderate verbal cueing throughout her treatment session. Patient did not tolerate the standing frame and she complained of being light headed and dizzy. The patient directed her caregivers and therapist in proper hand placement and amount of assistance necessary to assist her during self-care activities and transfers in order to prepare her for when she returned home.

A home evaluation was performed by occupational therapy this week. The home environment was assessed to determine if the patient would be able to return home or if there were adjustments that needed to be made to make her transition back home safe and accessible. An example would be if the patient was able to pull up next to the toilet in the master bathroom; if not to determine if there was another bathroom in the house the patient would be able to use or if remodeling would be necessary. With measurements obtained during the home evaluation of certain surface heights (bed, sinks, chairs, couch, etc.), the hospital surfaces (plinth height/hospital bed) were mimicked to situations the patient would encounter when returning to her home environment.

Week 4: The focus for week four consisted of wheelchair management and maneuvering with a new powered wheelchair (which arrived on Wednesday of this week), bed mobility, rolling, breathing exercises to increase lung capacity (stacking breaths, abdominal breathing, forceful exhalation), scapular power to facilitate mobility, T stretching (pectorals stretch) and frog stretching (groin muscles), self-directed care with transfers and hand placement, lower extremity management, sliding board transfers and sitting balance. This week the patient required minimum assistance and verbal cueing with all activities. Caregiver training was

continued with focus on transfers, lower extremity ROM, bed mobility, rolling, bed positioning, breathing exercises, stretching, autonomic dysreflexia signs and symptoms, and skin checks.

Week 5: The focus for week five consisted of caregiver training and performing a discharge evaluation of patient ability to perform bed mobility, transfers, rolling, leg management, and sitting balance with no upper extremity support (see outcomes for functional activities status at time of discharge). Patient was discharged home with 24 hr. care and home health therapies. No home exercise program was developed because a home health therapist was scheduled for the following week, and any adaptive equipment sent home with the family was filled out with the occupational therapist.

CHAPTER IV

OUTCOMES

Patient motivation stems from both intrinsic (self) and extrinsic (family, health care providers, finances) factors. Research has shown that with proper motivation, a patient will perform better in rehabilitation activities and make more gains than those with less motivation/enthusiasm during treatment sessions.[29] It has also been shown that poor participation (defined as less than maximal effort, doesn't finish exercises, and/or require more frequent encouragement)[29] will cause a decrease in FIM improvements, increase length of stay, and discharge to another facility versus home. Rehab providers can promote increased patient motivation and participation through "positive encouragement, willingness to empower the patient to become actively involved in the management of the rehabilitation program, and the ability to select appropriate means to achieve a given end"[30] in order to reach desired outcomes.

The patient was highly motivated and had excellent participation during every treatment session. This led to the patient's ability to perform bed mobility with supervision with the head of the bed raised, sliding board transfers with minimal assistance, sitting balance with no upper extremity support for 30 seconds with supervision, wheelchair management with supervision (moving leg and arm rests, and proper positioning of chair for transfers), modified independence with pressure relief in powered wheelchair, modified independence with wheelchair mobility in a power wheelchair, and minimal assistance with lower extremity management when rolling in bed. Patient no longer had reddening over the sacrum and after three repetitions of the modified

Dix-Hallpike maneuvers the patient no longer had complaints of dizziness when rolling.

Prior to discharge, the patient's family made the necessary house adjustments to allow patient to have full access to all parts of the home. Patient's family members and hired help were trained in proper transfer techniques to ensure the safety of the patient and caregivers. It was recommend that the patient continue to receive home health physical therapy to ensure she was able to continue to make gains in independent mobility and make the transition home safely.

CHAPTER V

DISCUSSION

Based on the patient's level of injury, age, severity of injury, motivation, and family support, the outcomes for this patient were extremely significant. Through her motivation to participate in therapy, good family support, and proper physical therapy plan of care with functional mobility as the primary interventions, the patient was able to make significant gains in achieving her independence. One barrier that was encountered by physical therapy was her neck brace. The neck brace prevented further advancement in mobility and self-care because the brace significantly limited the amount of mobility in the patients neck and upper 1/3 trunk. Based on the functional gains she made by the time of discharge, she will likely gain even more mobility and function over the next several months, especially when the neck brace is removed.

Other rehabilitation techniques not used during this episode of care include Functional Electrical Stimulation (FES), muscle strengthening, Brain Motor Control Assessment, robotics, and Body Weight Support Treadmill. These interventions have been shown to increase functional gains and independence, decrease osteoporosis, spasticity, medical complications, and overall will increase the quality of life. More research is still required to determine how effective and consistent these other rehabilitation techniques are in gaining further functional mobility.[17,31]

Currently there is no cure for SCI. Though, there are other therapy interventions to be considered in future research which could alter the recovery process. These include stem cells, steroids, and growth factors however significant research still needs to be completed.[32,33] These pioneering advancements in the recovery process have the likelihood that could change a

patient's ASIA classification. Being able to change classifications would greatly increase the likelihood of gaining more independent mobility, strength, and potential ambulation in SCI patients.

CHAPTER VI

REFLECTION

Reflecting over this episode of care, there were some specific items that I would have done differently and some items that went well. During the examination/evaluation process, I was unable to perform the ASIA because I was not certified/ trained in performing the assessment. I was able to gain insight in how to properly perform the assessment, how to grade, and interpret the results.

In the plan of care, I think the physical therapy goals may have been a little lofty, and I under-estimated the role the neck brace would play in the patient's ability to perform certain tasks. With this in mind, it looks like we did not meet most of our goals established even though the patient was able to make significant gains in independence from initial evaluation to discharge. This will allow me, in the future, to develop realistic goals that the patient can obtain without them being too easy, and consider more variables (depression, finances, family support, work, age, co-morbidities) that may influence the patients' recovery.

One thing I would have changed during the five weeks of therapy sessions would have been to focus more on patient education. Sometimes as clinicians we can become so focused on gaining functional mobility that we sometimes underestimate the importance of good patient education, especially when the patient is motivated to participate in sessions to gain more independence. Although after sustaining such a significant spinal cord injury, there are many physical changes that occur that will affect the patient for the rest of her life, which can be life threatening, such as autonomic dysreflexia and pressure sores. Teaching our patient about the

importance of these physical changes is just as important as gaining functional mobility. I will try and allot more time during sessions for patient education for all pathologies in the future.

Overall, it was an excellent experience to be able to see my patient make such significant gains over the five weeks and be able to return home with her family.

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